

AMENDMENTS TO THE CLAIMS

Claims 1-9 (Cancelled)

10. A method for fabricating an a-C:H gate ISFET device, comprising steps of:

- providing a semiconductor substrate;
- forming an virtual gate on the semiconductor substrate to define the gate area of the ISFET;
- forming a source/drain in the semiconductor substrate beside the virtual gate;
- removing the virtual gate;
- forming an a-C:H gate in the gate area to form a ISFET by PE-LPCVD.

11. The method as claimed in claim 10, wherein forming the virtual gate to define the gate area of the ISFET further comprises:

- rinsing the semiconductor substrate;
- forming a pad oxide layer on the semiconductor substrate;
- and
- removing a portion of the oxide layer to form a virtual gate to define the gate area.

12. The method as claimed in claim 11, wherein the PE-LPCVD is performed under conditions of:

- base pressure at least 10^{-6} torr;
- temperature of the semiconductor substrate between 140°C and 160°C;
- a mixing gas comprising methane and hydrogen at flow ratio between 6 to 10 SCCM;

the process pressure between 0.08 and 0.1 torr; and
a RF power between 145W and 160W.

13. The method as claimed in claim 10, further comprising a step of forming a gate oxide layer below the a-C:H gate in the gate area.

14. The method as claimed in claim 10, wherein forming the source/drain beside the virtual gate further comprises doping the semiconductor substrate by the virtual gate as a mask to form a source/drain.

15. The method as claimed in claim 12, wherein the ratio of the methane and hydrogen, in the mixing gas, is 30 to 70.

16. The method as claimed in claim 12, wherein the temperature of the semiconductor substrate is 150°C.

17. The method as claimed in claim 1, wherein the flow ratio of the mixing gas is 8SCCM.

18. The method as claimed in claim 1, wherein the pressure of the mixing gas of methane and hydrogen is 0.09 torr.

19. The method as claimed in claim 1, wherein the RF power is 150W.

Claims 20-49 (Cancelled)